Notebook, N-01-12-03

This notebook was used during December 1901. All entries are by Edison. The book contains entries, numbered from 1450 through 1486, regarding a set of nickel-iron storage battery cells. Included are notes relating to each cell's rate of electrical discharge and to the production of gas during the tests. The numbered entries do not appear to correspond to those in a concurrent series of cell test notebooks, N-01-12-12 and N-01-12-15 [not selected], which also encompass numbers 1450-1486. The pages are unnumbered. Approximately 60 pages have been used.

N. F. Bailey — Dec 3rd 1901

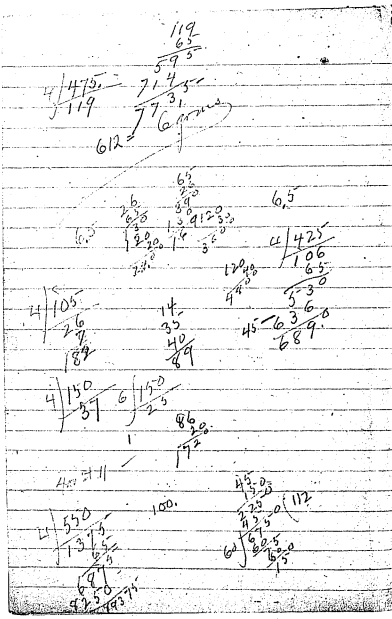
For circulation, per dead persons cup
mixed —

Lauder —

Instead of Ni hydroxide, use Ni_2O
Reduced by H from Oxalate,

Also heat Mix of Ni hydroxide
graphite, 100 Rollings by Dry
Chlorine, to peroxidize it, make
grid & soak to get out NaCl —

14th Dec - $NaC_6H_5O_7$ = KOH, washing 6 oz
" " " + Hypo 5 oz
" " " + alone no pay



gram with grid — 8442 Ni ox by KOH — 4 gram

1452 — 1046 am on = 11 am diff expanding within grid squares at slightly grid dot seems to show swell — 1101 a very little going
growing 1% of full at 1121 am
think of notice slight swell of grid —
1130 am growing 1½% of full —
on 1235 — 1240 pm no glow
on 1 hour 29 minutes growing 1½% —
140 pm growing 2%
after 2 hours + 9 minutes gas 2%
bubbles still form on outside of grid
gas lifted & clinging to grid —
217 pm growing 5½% —
3 pm / gassing 10%

Swelled from 86 to 103 17 swell —

Monday — 845 am put on reservoir
400 till 9 am 1 hour 15°
9 am no gas — 9:27 no gas
212 Mah at 945 am — no gas
250 " " 10 am — "
325 " 1030 AM "
350 10 40 "
400 " 11 AM "
425 1110 " "
475 — 1130

Mah at 3 pm
Gas 2%

3 34

1046 to

2 ½ hours but

2 30

3 15

1 1 1 1

14

14

35

60

2 9

grav. mch 4+2 N2OK by KOH –

1451 On 1046 11 am stuff expanding within grid appears cont slightly grid dist seems to swell 1101 am shows faint gravy –

1121 am gravy 1% of full –

think 9 inches slight swell of grid

1130 gravy 1½% of full

on 1235 1240 no grav

on 1 hour 29 minutes gas 1 @ 1½%

1140 pm gravy 7%

after 2 hours + 9 minutes gravy 2%

Bubbles still from oil along the black cliff expanded from + changing to outside of grid –

217 gravy 5%

3 pm " 10%

4 pm 15%

Green material grid
NOX by ROH

DEC 14 1901

203

1450 - On 1046 - some of the green came out but it was probably in outside indentation
It also started gassing slightly when put on 1107. The gassing is just the same now if anything + very small - 2% of full probably
The grid had a welled slightly but not much -
Noticed when current was off for 1 minute the gassing kept right in - possibly it was that was originally in coming out by gradual swelling of material
1118 - gassing a little more freely about 8% of full -
1122 am noticed a froth around top of binding post that is a bracket from the others -
1130 gassing abt 8% of full
on 1235 1245 gassing 8%
1120 gassing 10% after being on 1 hour 34 minutes -
140 gassing 12% -

On Regular discharge this only was it 48 minutes down to 75 -
Showing greater necessity of graphite.
put back on charge 930 -

Pb_2O_3 842 – by green NiOx by KOH, by H_2O
group 842

No 1454 on 1110 am

1116 am – stuff squirting out slightly, & it is going slightly – a large number of gas bubbles collect on outside which is brown. 1128 going 5% of full
1130 going 10% which is much more than 842 green

on 1235 1240 going 10% —
103 pm going 12% Bubbles stick
Wire still clear, No swell yet
110 going 15%
140 going 15% – 217 go 20%

N_2O_3 from Green N_2O_4 by KOH by Hypo grav 8842

415 gram cake

1455 on 1110 am —

1116 am stuff squirting out slightly
gets growing slightly a large number
of gas bubbles collect on outside of
gas. 1118 growing 5% of full —
~~Short notice slight amount of gas 1120 am~~
@ 1130 growing 10% volume is much
more than 8422 gasen —
On 1235 1240 growing 10%
103 pm growing 12% bubbles still
hanging all over No swell yet.
110 growing 15% 140 growing 15% —
217 gas 20%

Swelled from 105 to 118 13 swell

Monday 845 put on recovered
400 ma till 9 am — gam 150 —
No gas —
at 1122 gas started
1125 gas full —

450 mah —

This is heavier cake than
1452 + 1452 has gone 450
without gassing —

150 measurement

137

137

15
4
6
6

150
3
4
2
0

100

100
3
4
2
0

50

105
13
3
5
0
120

105
13
3
5
0
120

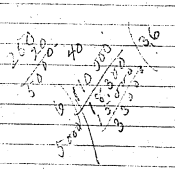
1110

425

2

Our Clock 25 M

Now —



N_2O_3 without graphite – green N_2O_4 by KOH, by Hypo

1458 on 1132 am – No graph (block) –
off 1135 or Noon –
on 1235 pm – 1240 – ½% gas
& no stuff splashing – plate rather
clean – a few bubbles collecting
on outside 1.05 pm – no squirting
out of material, clean ~~no gas~~
gassing 2% – Very little stuff
fallen from grid & that is from
outside probably.
1.15 pm on 43 minutes gassing 2½% –
140 gas 8% – all N_2O_4 + Hyper + 8/minute
1.55 – nothing squirts out gas 10%
Clean grid –
2.10 gassing 12% – 442 gas full –
at 442 Reversed the Coil to see
how long before it would stop gassing –
at 450 gas nearly stopped
& reverse back at 453 pm to Ordinary
No gas at 457
at 504 gassing nearly same as when
disconnected & reversed.

Monday 845 put on Reversed
855 gassing full –

Na_2O_2

Na_2O_2

Na_2O

14

1046 24

24 3

Remarks about preceding tests.

I pulled plug for 1/2 minute but gassing wasn't light on all grids.

pulled plug 7 25 till 7 27 — gassing on all dimmed only

1/3rd = I noticed on the road of test Mixture gassing Rept. undimmed —

Phenomena —

I notice that all of the stuff containing graphite that falls from grid into bottom of glass has big gas bubbles clinging as it leaves bottom of jar (Observed like black stuff from 1453 Na_2O_3 that had no graphite mixed layer at bottom of jar without a bubble on it) also the green in 1450 — Can there be local action)

Notice gas bubbles from which on
frame
No gas bubbles which can be found
faced up of 1450 —
Barely any except in one
Operation 1453 —
So far the green 692 seems to be best
"

on 1030 Received

100 grams KCl 1438 not growing at 30°
415 growing 50%

200 KCl 1439 315 growing 50%
There was a lot of foam formed on the 1st chip
the also overlay at 1 hr. Va. Stopped good thin growing
of others - 3110 growing

300 KCl 1440 - 315 not growing
430 gro 50% full 435

400 KCl 1441 315 not growing
Standard gro 445 gro

500 KCl 1442 315 not growing
341 growing strong 50%

600 $KClO_3$ 1443 315 not growing
415 growing full

700 $KClO_3$ 1444 315 not growing
435 growing

800 $KClO_3$ 1445 315 "
4 growing

900 $KClO_3$ 1446 315 "
435 growing

over

Removed all only—

Mixture 2 parts NO 1 pt N_2O_3 - NO prod — by Roth & Hupe prelim.
2 pt N_2O_3 + N_2O_3 —

1458 = on 307 pm —
322 growing 15 ½ — S
Now why does this go right off?
430 growing fast —
This seems to be NG — S S

Monday 845 put on recovered
855 growing full —
but the brew 400 ma involved 150
at 9 am 150

1460 ON 525 pm — 842 Kottmeier

fine grained low pitch heating No OX

by KOH — Very dark brown creeping

on Black —

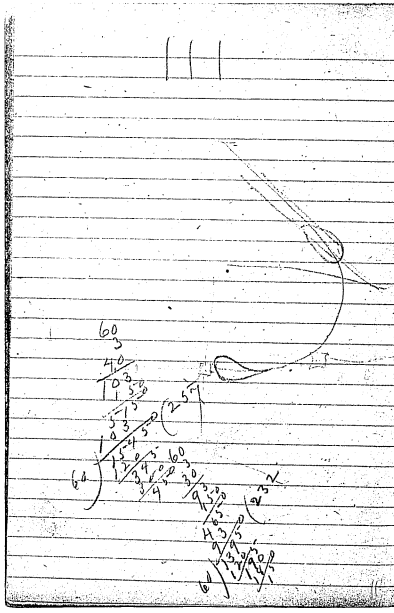
545 ~~[illegible]~~ g among

8 1/2 —

1460

842 mix
Kore mat
1461 – Same as 1460 Cut not ground
– Lumpy + unsquareness, heated long
time in porcelain Evaporated
dark brown nearly black
on at 535 –

Monday 845 am put on reoxed
400 till 9 am – 9 am 150 ——
grams 1/2 at 9 –



1452 Continued - has been reversed
Reducing till 500 mah + little growing
for 1 hour reducing - it is reversed
Only or charging at 1,07 pm —
1% growing at 8/0. —
380 11% growing - 4 pm growing 6%
432 mah —
Reversed 435 — at 6.35 pound
Was 175 now 150 635 —
Was charg
gased 700 — 500 mah
at 8/7 Reversed charging —
950 - trace gasing 232 mah —
10 pm " " 257 "
1020 1% growing 307 mah
1030 2½% " 332 "
1050 5% " 387 "
11 — 5% 407
Went home —

60
10
25
95
150
475
95
380
28
60) 1400
120
200
140

12) 120
120
0

6) 140
25

1455 (Continued) fully charged & gassing on over charge 1 hour
recovered chg (10) ampz at 107 pm —
172 ma on Ront Rubo how long
150 at 135 pm - 215 just a short flow
of gassing — 1% gassing at 310 -
335 10% gassing 4 pm gassing 15%

Reversed 435 pm discharge
at 635 pm 175 ma 175 now
635 150, no gassing
good 720

410 mah

Reversed charging 7.50 pm —
855 no gassing 162 ma
9.25 - perceptible trace of gassing 237 mah —
945 1/4% gas very small 300 mah —
10 pm gassing 2% — 325 mah —
1020 10% gassing 375 "
1030 15 " 400 "
1050 25 " 450 '
11 50% 500

Went home —

1468 gwa-mi in furnace
very block —
on charg 835

10 pm	no gas	212	mah no gas
1030	"	300	" "
1050	"	337½	" "

21) 150 (5
105
45

15 595
150
195
150
450
450
0

60) 1295 (21 12
120
195
120
750
600
150

1469 9wa
Influence very Black
on chg 835
10 pm 212 Mah no gas S
10 30 300 " no gas
10 50 337½ " no gas

60 | 17.(1,28
600
170
120
50

77
150
385
57
60 | 192
115
60
55
54
1

1455 – discharged in Solution of 400 cc Water 215 grms Stick KOH, I figure 35%
KOH —

at 1110 started gassing full all at once discharging
gassing on frame
Reversed chg at 1120 am
immediately stopped gassing on reversal
~~1147~~ – off 10 min —
at 1247 gassing 1/2 % — 192 mah
1 pm " 1/2 %, no chg 242
117 pm " 1/2 no change? 284

	120	1/2
145 pm	3%	
225	8	
235	10%	nothing yet
300	10%	
310	50%	
315	75	

284
90
3 54

284
90
1 40
2 00
42 00
40
43
60

192
60
24

1 40
15 40
60 00
13

17
13 50
10 50
1 00
5 00
75 00
142
60

1452 35% Sol same 1455

1110 not yet gassing –
1115 started gassing & in 5 sec
gassing full – gassing on frames.

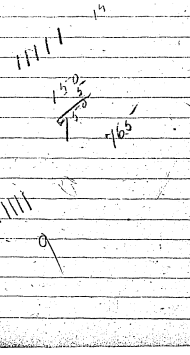
Reversed chg 1120 am –
many dropped gassing on reversal
Stopped 10 minutes.

at 1247	1/4% gassing	192 mah
1 pm	1/4 gas in manifold	242 "
117 pm	1/4% no chg.	284
1/2 at 145		354
1% at 225		454
5% at 235		
10% 3 pm		
20% 310		
75 315		
full 330		

not very fast

charging up to 5 pm

On disch 5 pm



Bre19—

Experiments with 100 pass Reg Ni grid in 20% KOH with different impurities in the liquid to determine their effect in all connections with regard to the battery.

All these been soaking all night—

~~CuO_2H_2 in 20% KOH Sol. 0.5 gram~~

On 915 A.M. – 150 m.a. charge—

CuO_2H_2 = 924 gassing 1% —
950 – 1050 % gas – plat pole all covered with spongy Cu. 1012 gassing 1/2 %
1054 gassing 1/2 % 1120 2 %
12 65 % 1230 45 % /
1 pm 35 % 145 50 % 215 full
from – Cup bright.
Read dredy 320 420 no gas 520 no gas 550 no gas
625 no gas

on 915 am

1 pt K Nitrite 20 pts Roff.

1012 very slight growing

1120 3% 12 noon 5%

1230 10%

1 pm 50% 145 65%

215 75% frame & cup do normal

Reversed douche 320 420 no gas 520 no gas

550 no gas 625 no gas

on 915 am

1 pt RCy 20 KOH

10.12 very slight growing 1/4 %
grid very bright & clear 1120 1/4 %
12 noon 1/4 1230 ~~[illegible]~~ 1 %
1 pm 5 % 1 45 pm 20 %
215 20 % frame & Cup bright
Revsd Ducks 320 pm 420 no gas 520 gas filling

4 pts RCy — 20 KOH on 915 am
1120 no gas —
12 noon no gas 1230 no gas
1 pm no gas 145 pm 10 % 215 — 10 %
by pulling light behind I find that at 230 there is not more than 2 % growing
The Solution is quite yellow red — grids bright.
Rcy radical keeps inner pore alkaline —
This may be a big thing if no secondary reaction or neutralizing or action on frame
~~frame & Cup Rcy bright~~ —
Reversed ducks 320 420 growing full 5 mg

on 915 am

1 part H_2SO_4 to 20 KOH, large precip at bottom 1¼ high

1015 growing 1/4 % grid very bright & clean

1120 50% / 12 noon 10%

1230 25% 1 pm 75% or full

145 full — 215 full

Cells bright,

Reversed polarity 3 10 pm — 420 no gas 520 no gas

550 no gas 625 no gas

on 915 am

50 milligrams CoO_2H_2 in Cell

1120 grid + cups all covered black

no gas — 12 noon 3%

1230 10% 1 pm 25%

145 - 50% 215 full!

Removed block 320 pm 400 no gas 520 no gas

550 no gas 625 no gas

on 915 am

200 Milgms CoO_2H_2 in Cell

grid + Cups Coated black no gas

at 1120, 12 noon 6%

1230 20% 1pm 30% 145pm 50%

715 full

Reversed Discha 820pm 470 no gas 520 no gas

550 no gas 625 no gas

on 915 am

1 part Silica 20 KOH

11 am gas 1/8 % 1120 1 %

12 noon 5 % 1230 10 % 1 pm 20 %

1 45 pm 50 % 215 50 %

Reversed electrodes 320 pm 420 no gas 520 no gas

550 no gas 625 no gas

on 915 am

1 pt Silica - No 2 1120 am. 1 %

12 noon 5 % 1230 15 %

1 pm 30 % 145 pm 50 % 215 50 %

Reversed Electrodes 320 pm — 420 no gas 520 no gas

550 no gas 625 no gas

on 915 am

Cell Saturated with Lime

prep. 1/4 deep at 6 Gallon

Can't see water but water no gas 11 am

Can't see gas 10 1/2 1230

~~Rev~~ Reversed Discha 320 gm — 420 no gas 520 no gas

550 no gas 625 no gas

No 1 on 9.15 am

1 part Sulphide Potash 20 KOH

950 Sulphur depositing on Cup

1035 few bubbles attaching to Cup

1/8% gas 11 am no gas

1120 Cup very dirty gas

bubbles pretty black 12 Noon no gas

Lots bubbles adhering

1230 1/4% 1 pm 10% 145 - 50%

215 500%

Revised Dirty 320 PM 420 no gas 520 no gas

550 no gas 625 no gas

No 2 on 9.15 am

Duplicate

952 Sulphur depositing on Cup

Very few bubbles attaching no gas

11 am no gas

1120 Same as No 1 12 Noon No gas

Lots bubbles adhering 1230 1/4%

1 pm 10% 145 pm 50% 215 1/4%

Revised Dirty 320 420 no gas 520 no gas

550 no gas 625 no gas

on 915 am

Woodpaper boiled in the KOH 20%
Sediment 1/16 thick at bottom
950 (a few gas bubbles attached)
no growth — growth 1/16% 1035
growth 1% 11 am
1120 growth 3% 12 noon 5%
1230 20% 1 pm 50% 145 75%
215 full grid block in opals
Dark darkened solution yellowish
Record Density 320 PM — 420 no gas 550 no gas
625 no gas

NO 2 on 915 am
Duplicate. grid coated
Connected with gas bubbles + slight
signs of growth 950 1035 growth
1/2% growth 1% 11 am
1120 growth 3% 12 noon 5%
1230 20% 1 pm 50%
145 pm 75% — 215 full — grid or
same block in opals Solution yellowish
Record Density 320 PM — 420 no gas 550 no gas
625 no gas

on 915 am

Cell Estimate of Barium Carb
Sediment 1/4 thick 950 growing 1/2 %
bubbles allowed to Cup 11 am 2%
1120 5% 12 noon 8%
1230 30% 1 pm 50%
145 full
Revised Ovsky 320 PM 420 no gas 520 no gas
550 no gas 625 no gas

X02 on 915 am
Duplicate 930 slight growing
950 growing 1/2 % bubbles allowed
to Cup — 11 am 2%
1120 5% 12 noon 7%
1230 30% 1 pm 50% 145 pm full
Revised Ovsky 320 PM — 420 no gas 520 no gas
550 no gas — 625 no gas

on 915 am

1 part Oxalic acid 20 KOH,

1005 few bubbles attaching to grid

1035 growing 1% to 1½% 11 am 1½%

1120 8% 12 noon 15%

1230 40% 1 pm 75% 145 full

frame + part Cup darkened

Revived Arcing 320 PM 420 no gas 520 no gas

550 no gas 625 no gas

on 915 am

5 parts Oxalic in 20 KOH

1005 growing 1% 1035 growing

2% — 11 am 3% —

1120 growing 15% 12 noon 15%

1230 50% 1 pm 75% 145 full —

frame + part Cup darkened

Revived Arcing 320 PM — 420 no gas 520 no gas

550 no gas 625 no gas

1/4 sat BaOH, on 915 am —
Cloudy slight sediment.
11 am 1/4 % 1120 1 %
12 noon 5 % 1230, 20 %
1 pm 33 % 145 full frame + Cup
bright
Recd Discdg 320 PM — 420 no gas 520 no gas
550 no gas 625 no gas

Saturated BaOH. on 915 am
1/4" Sediment
956 gassing 18 % bubbles attached
to Cup — Schwartzliff (black) coming out
of falling Surface Cup whitening
11 am. 2 % — 1120 3 %
12 noon 8 % 1230 25 %
1 pm. 40 %. 145 full — frame + Cup
bright —
Recd Discdg 320 PM — 420 no gas 520 no gas
550 no gas — 625 no gas

2 parts Nitric acid 20 KOH on 915 am
1005 few bubbles steady
1015 growing 1/4 % 1035 1/4 %
11 am 50 %
1120 10 % 12 noon 15 %
1230 25 % 1 pm 75 % 145 full
foam + Cup about as usual
Record Daily 320 PM — 420 no gas 520 no gas
550 no gas 625 no gas

5 parts Nitric acid on 915 am
1005 very slight growing
1035 growing 2 %
11 am 6 % 1120 15 %
12 noon 20 % 1230 60 %
1 pm 75 % 145 pm full — foam + Cup
about as usual —
Record Daily 320 PM — 420 no gas 520 no gas
550 no gas 625 no gas

1448 Special KOH 8 on 915 am
955 gassing 1%
1015 gas 5% / 1035 7%
11 am / 10%
1120 / 15%
12 noon 25% 1230 80% 1 pm 50%
145 full
Revised Quiz 320 PM 420 no gas 520 no gas
552 no gas 625 no gas

1444 Special KOH 9 on 915 am
955 am gassing 1% 1015 gassing 7%
1035 9% 11 am 10%
1120 33% 12 noon 40%
1230 full gas 1 pm 80% or full.
145 full
Revised Quiz 320 PM 420 no gas
520 no gas 550 no gas 625 no gas

1481 Discharg 320 PM — gas full 420 mg

1480 Discharg 320 PM 420 full — mg
mg —

1479 Discha 320 PM 420 full ng

1476 Discha 320 PM 420 full ng

1477 Dischg 320 PM - 420 full ng

1476 Dischg 320 PM 420 full ng

1475 Dischg 320 PM 420 no gas
520 no gas 550 gas full

1474 Dischg 320 PM 420 no gas
520 no gas. 550 gas full

1455 35% - Crystalline ORF - old test
g notice that the grid + cup unlike
all other models is coated dark Brown
Discharg 3.20 PM - 'no gas - 520 shadow of gas
550 no gas 625 no gas

1452 35% ROH.
g notice ~~that~~ grid + cup unlike all
other models is coated dark Brown
Discharg 3.20 pm - 420, shadow of gas
520 shadow of gas comm at 420, 550 no gas
625 no gas -

on 915 am

1468 swelled nearly as much as 1469
12 noon 3%
1230. 15% 1 pm 40% 145 full
Discharg 320 pm 520 no 90

on 915 am

1469 Swelled Enormous
12 noon 30% 1230 15%
1 pm 40% 145 full
Reversed Discharg 320 PM 520 no 90

1483 on 1012 am
1130 gasing 25% —
12 noon full gas
Rwad Dinlg 320 pm 420 gas full ng

1484 on 1012 pm 1128
gasing 25% noon full gas —
Rwad Dinlg 320 pm
420 gas full ng —

1 part K Vanadate 20 KOH on 1040 am
1054 growing 10%
12 noon gone down to 1%
1230 3% & pm 5%
145 20%
302 full
Revived slowly 320 PM 420 no gas 520 no gas
550 no gas 625 " no gas

1 pt Manate Soda 20 KOH, on 1040 am
Contrea
Revived slowly 320 PM

No 2 Cupric Hydrate in KOH

on 1040 am

1050 growing 5%

1230 5% | 1 pm 15%

145 25% 215 50%

Reversed Dissolving 320 pm 420 no gas

520 no gas 550 no gas 535 (15 min) gas full

1485 on 1106 am
12 noon no gas no swell
1230 no gas 1 pm bubbles on no gas
145 - 1/4% 215 10%
Reboil Dosing 320 pm 420 no gas
520 gas full - last time on neg

1486 on 1106 am —
12 noon no gas no swell
perhaps a little 1230 pm no gas
1 pm bubbles on no gas
145 1/4% 215 10%
Reboil dosing 320 PM
420 no gas 520 gas full - last time neg